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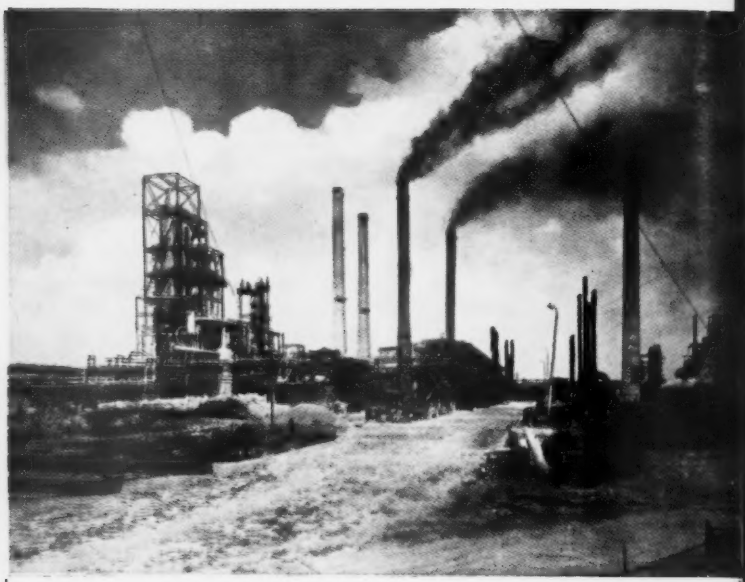

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THIRD CADMAN MEMORIAL LECTURE

The Third Cadman Memorial Lecture was delivered by Dr R. E. Wilson, chairman of the Board of Standard Oil Company (Indiana), to a large audience in the hall of the Royal Institution on June 21.

The title of the lecture was "Competitive and Co-operative Research in the American Petroleum Industry," and Dr Wilson said there are a number of factors which must be present to give competitive research the best results. Amongst these, he asserted, are:

First, there must be a reasonable number of strong companies, able to attack problems aggressively from different viewpoints.

Secondly, there must be a sound patent system, to furnish incentives and at the same time to encourage prompt publication of research results. Competitive research kept secret for any long period is wasteful.

Thirdly, there must be freedom and willingness to license others at reasonable rates, and to enter into cross-licensing arrangements where needed. This may well include the exchange of ideas and co-operation on pilot-plant and process design work in advance of building very expensive commercial units.

Fourthly, there must be no agreements on prices or in restraint of competition. The American cross-licensing arrangement is in no sense a cartel. It does not set prices, establish quotas or divide up marketing areas. It boosts competition instead of discouraging it.

The American petroleum industry, he said, is committed to competitive research, and considers such research the most valuable for most purposes.

He pointed out, however, there are fields in which co-operative research has been found preferable. He referred to

the work of the Co-ordinating Research Council, sponsored jointly by the automobile and petroleum industries, and to the American Petroleum Institute. He declared that the API research has repaid the industry—and so the public—many times what it cost.

He added that the industry generally believes that government research and pilot-plant work along the lines of exploring the possibility of synthetic fuel production from coal and oil shale should be continued.

However, he declared, the industry does not share the view of those in the Bureau of Mines who assert, with some political support, that the government should shortly proceed to build or subsidize large-scale 'demonstration plants' at very high costs. Such plants would be obsolete before they were finished, could not possibly compete without a big government subsidy, and would contribute less to the development of the processes than five per cent as much money spent on well-planned bench-scale and pilot-plant research and development.

Applied industrial research in the United States, in spite of its great public benefits, faces a number of threats, Dr Wilson said.

Some people, he declared, object to the whole idea of granting a temporary monopoly through patents. Others object to the competitive advantage research gives, and wish to destroy any such advantage—thus, of course, removing the incentives for applied research. A few people fail to understand that technological unemployment is a myth so far as the over-all economy is concerned; whenever there is unemployment, they wish to declare a moratorium on research. It is noteworthy that they quickly disappear in times of national danger.

Another threat is that of government competition in the applied field, which of course would discourage research by industry. High taxes not only reduce the funds available for research, but reduce the incentive to develop and install new processes when the possible profits would largely go to pay excess profits taxes.

Still another threat is the drafting of technical men for non-technical service.

It is almost unbelievable, he went on, that the continuance of applied research would be jeopardized by its millions of beneficiaries. But just when research is getting more difficult and expensive, we are faced with the widespread weakening of incentives and new threats to individual and business freedom. Research is today in real jeopardy unless you and I, who understand it, get its great story across to the general public.

Dr Wilson gave a case history of cracking of petroleum molecules as a major discovery and development of American petroleum to show the values of competitive applied research.

This discovery, made by his company in 1913, set off a chain of research developments that initially assured the future of the gasoline automobile and had these other effects quoted by Dr. Wilson:

1. The actual yield of gasoline from a barrel of crude oil has more than doubled, and the potential yield has quadrupled.

2. The average octane rating of motor gasoline has been increased from 50 to 87. That means that, in an engine designed to utilize it effectively, one gallon of to-day's gasoline will do the work of two of 1916 quality.

3. To-day's piston engine for military aircraft will produce over 10 times as much power, with half the weight per horsepower, as compared with World War I's best engines.

4. Over 90 per cent of the molecules in to-day's military aviation gasoline (and about 60 per cent in motor gasoline) are made by synthetic chemical processes, most of which were unknown

Dr Robert E. Wilson delivering the Third Cadman Memorial Lecture and (right) *receiving the Cadman Medal from the hands of Mr C. A. P. Southwell, president of the Institute of Petroleum*

20 years ago. Research has transformed petroleum refining into essentially a chemical synthesis industry whose operations dwarf all the synthetic processes and products of the "old line" chemical industry.

5. In spite of all the improvement in quality, the price of gasoline (excluding taxes) since World War II has been so low that it represents a saving to the United States public of over four billion dollars a year as against the price in 1920! Relatively speaking, gasoline is the cheapest major product on the market to-day. Keeping prices comparatively low has played a large part in stimulating the sixfold expansion of the American industry since 1916.

6. The benefits of applied industry to the industry and the public have been so outstanding that the number of technically trained men engaged in research and development in our industry is at least 40 times as large as in 1916. Its annual expenditures are now in excess of $100,000,000 per year.

The Presentation

At the conclusion of the lecture Mr C. A. P. Southwell, M.C., president of the Institute of Petroleum, presented the Cadman Memorial Medal to Dr Wilson, explaining that the Medal was a token of the industry's appreciation of the service rendered by Lord Cadman. He reminded the audience that Dr Wilson had published over eighty scientific papers and had nearly one hundred patents in his name. During the war he had served the Allied cause with distinction and was the holder of two great honours in the chemical world—the Chemical Industry Medal and the Perkin Medal.

Presenting the Medal, Mr Southwell expressed the hope that Dr Wilson would have many more active years in which to continue his work.

Dr Wilson received the Medal amid applause and signed the Institute of Petroleum Book of Honour.

The Medallist at Dinner

Following the lecture Dr R. E. Wilson was guest of honour at an informal dinner held at the Tallow Chandler's Hall in the City of London. The chair was taken by Mr C. A. P. Southwell, M.C., and many leaders of the petroleum industry in the United Kingdom and representatives of Government departments were present. The company also included Mr Frank Porter, president of the American Petroleum Institute.

Mr C. A. P. Southwell, speaking after the dinner, said:

To have as our guest to-night so distinguished a personality as Dr Robert E. Wilson is a source of pride and pleasure to the Council of the Institute of Petroleum. It is my privilege on their behalf to bid you a most hearty welcome from the Institute which is representative of all branches of our industry.

I wish to pay tribute to you, Dr Wilson, for your attainments in the petroleum industry, as a notable figure in American life, as one who understands people, and an example of all that is best in the petroleum industry.

We are very glad to have this opportunity of furthering the bond of friendship between our country and America. Just a year ago I had the good fortune to visit several of the oil producing states of America, both in the south and on the west coast and everywhere I experienced that traditional American hospitality. Everywhere I experienced a great interest in the problems we have in Britain. It was a great tonic and always is, to those of us who are fortunate enough to be able to cross the Atlantic to your side and we all appreciate the great freedom with which you give freely of your experience in the petroleum industry.

In welcoming you, Dr Wilson, to-night as the third Cadman Medallist, it is fitting that we should consider how the Cadman Memorial Medal came into being.

The British petroleum industry lost a great friend and a great leader on the death of Lord Cadman in 1941. The Institute lost a great source of inspiration. We in the Institute of Petroleum were therefore gratified beyond measure when Sir William Fraser and other friends of Lord Cadman in the Anglo-Iranian Oil Company decided to subscribe a sum of money to perpetuate his memory. As a result a fund was inaugurated and the Cadman Memorial Medal and the Cadman Lectures were established under the auspices of the Institute of Petroleum. It commemorates a great friend, a great exponent of the scientific approach to all petroleum problems and a great oil man.

As a Founder Member of our Institute and twice the holder of the presidential chair, we in the Institute of Petroleum were proud that his friends decided to associate the commemoration of his name with the Institute.

Like our guest this evening, Cadman started his career in the academic world. As one who was taught in the university by Cadman, I know from close personal contact in those days what a wide vision he had of future petroleum problems and the need he felt for a constructive approach so that this source of nature's energy should be used as part of a scientifically conceived plan.

You, Dr Wilson, have already received important American awards as marks of your attainment in America and we hope that the Cadman Medal presented to you this afternoon will rank with these as a mark of the high esteem with which we on this side of the Atlantic regard you.

This dinner to-night is a domestic affair, as informal as possible so that we can all meet you, but it is held in one of the historic Guild Halls representing great commercial traditions in the industry of this country. The origin of these Guilds is interesting. In the reign of Edward III in 1363, an act was passed that "handicraftsmen shall use but one Mystery" and in 1393, the Tallow Chandlers' Company was duly organized.

One hesitates to think what would happen to the petroleum industry if men like our guest had had to confine themselves to just "one Mystery" in their research activities. The Tallow Chandlers' Guild received a charter granting it special powers for weighing and measuring tallow and candles and oil and destroying such of these articles

as were bad, adulterated or unfit for use. It also had powers over weights and measures of the trade. It is therefore most suitable that we should welcome our guest in this hall belonging to a Guild which in antiquity was thinking and acting on methods later to be adopted in the petroleum industry.

Many of the Guild Halls were lost in the Great Fire of London, the Tallow Chandlers' was one and this hall was re-built in 1672. It fortunately survived the Hitler blitz. Its grant of Arms is interesting. It is a compliment to the trade, "Supporters being Angells crowned with stars in token of light whereof their Mystery is a beautiful imitacion." We hope that our meeting here to-night will help you to remember the honour that you have done us in making this long journey to deliver your address this afternoon.

I hope that our guests who are joining in welcoming Dr Wilson will forgive me if I do not mention each one by name but I would like to take this opportunity of saying how pleased we in the Institute of Petroleum are to have with us for the first time in England, Mr Frank Porter, the President of the American Petroleum Institute.

I now ask you to charge your glasses, rise and drink to the health of the Cadman Medallist 1951—Dr Robert Wilson.

The toast was received with acclamation.

Dr Robert E. Wilson said he was very appreciative of the great honour which had been conferred upon him that evening. He remembered Lord Cadman when, as Sir John Cadman, he visited America in the early 1920's and he had been impressed by his personality.

The award of the Cadman medal on two successive occasions to an American citizen was a tribute to the broad-mindedness of the British and it forged yet another link between the two nations. The Perkin Medal was also another link in the chain for, although awarded in the United States, it was of British origin.

In conclusion, Dr Wilson thanked them for having listened so patiently to his lecture and for the great hospitality which had been shown to him.

Mr Frank Porter expressing his pleasure at being present at the function, referred to happy relationships which he had had with Mr Southwell in regard to the search for oil in Britain. He also expressed his pleasure at having been able to attend the World Petroleum Congress at The Hague and to have been thus able to meet many old friends and to make many new ones.

It was gratifying to have been present while honour was being paid to his colleague, said Mr Porter. In spite of the many duties devolving upon him, Dr Wilson had given freely of his time to research and was a great credit to the petroleum industry.

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OIL SEARCH IN NIGERIA AND UGANDA

The Shell and Anglo-Iranian Oil companies, who have been jointly exploring the territory in Nigeria for some years, hope to begin drilling in Owerri province within the next few weeks. This written reply was given in the House of Commons on June 27.

Reports of the director of the Geological Survey of Uganda state that a gravity survey of the floor of the Rift in the Kibuku area was made during the summer of 1950. The sediments in the vicinity of the seepage appear to be about 6,000 feet thick, very much more than had been anticipated. Core-logs already indicate the irregular nature of the Kisegi beds.

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Photoscote Process. Bulletin 9 of the Chicago Bridge & Iron Company, 332 South Michigan Avenue, Chicago 4, contains information on the pickling and painting of steel by the Photoscote Process.

COUNCIL COMMENTARY

The May meeting of Council was a short one since the usual Ordinary General Meeting—a symposium on combustion reactions in relation to gas turbine practice—started at 4 p.m. instead of the customary 5.30 p.m. Much of the discussion ranged over the selection of the British representatives on the Permanent Council of the World Petroleum Congress.

The June meeting was held on June 13 with Mr E. J. Dunstan, vice-president, in the chair. Council heard with regret of the death of Mr W. Bruce Dick, a Founder Member of the Institute, and of Dr Arthur Wade, a former Member of Council.

Now that the Third World Petroleum Congress is over, the present Permanent Council has resigned and a new one has been formed to take charge of affairs. The three British representatives on the Permanent Council are chosen by the Institute and the IP Council have nominated Messrs C. A. P. Southwell and T. Dewhurst, and Col. S. J. M. Auld to fill these posts.

The President's Committee has met Mr L. C. Burroughs and Dr K. G. Mackenzie of the ASTM and has discussed ASTM and IP co-operation on standardization matters.

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NEW ALBERTA OILFIELD

The correspondent of *The Financial Times* reports the discovery of a new oilfield, nine miles north of Edmonton and near the Campbell field. The potential output of the discovery well is estimated at 720 b.d.

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OIL WELL FIRE AT NAFT SAFID

During the recent fire at a well at Naft Safid, Persia, the main obstruction on the well head was blasted by a 350lb charge of gelignite after 12 days' hard work. Left is seen the fire at its height and right M. Kinley, the American oil fire expert, D. Dunlop, drilling superintendent, and Mr Martin, field superintendent.

The opening ceremony in the Ridderzaal (Hall of the Knights) at The Hague was honoured by the presence of H.R.H. Prince Bernhard, seen in the front row with H.E. Prof J. R. M. van den Brink (Netherlands Minister for Economic Affairs), who formally opened the Congress. On his right are Jonkheer O. C. A. van Lidth de Jeude and G. A. Tuyl Schuitemaker.

THE WORLD PETROLEUM CONGRESS

In the Autumn of 1932, the Council of the Institution of Petroleum Technologists had under its consideration the holding of an Overseas Summer Meeting. During the discussions, leading Members of Council, in particular Professor J. S. S. Brame, C.B.E., Dr A. E. Dunstan, and the late Mr James Kewley, proposed that the leading petroleum chemists should be invited to participate in a discussion on means of facilitating international co-operation in standardization of tests for petroleum and its products.

At the same time, it was realized that the great strides which had been made in petroleum technology since the 1914-18 war made it essential that the scope of the proposed meeting should be extended to cover the whole range of the petroleum industry.

Thus, the idea of a World Petroleum Congress was born and a committee was formed to formulate plans for the organization of such a gathering. No time was lost and when the Congress opened in London on July 19, 1933, under the presidency of Mr T. Dewhurst, President of the Institution of Petroleum Technologists, two hundred and forty-four papers, covering every phase of petroleum technology, had been prepared by specialists and were ready for discussion. Nearly 1,000 delegates from thirty-six countries were present at the Congress and the report of the proceedings, published in 1934, occupied over 1,500 quarto pages.

Speaking at the banquet held during the Congress, Mr T. Dewhurst suggested that the Congress might become a Petroleum Technologists' League of

Jonkheer O. C. A. van Lidth de Jeude, president of the Third World Petroleum Congress.

Technologists, as the delegated authority, agreed and accepted the invitation.

So, on June 14, 1937, Mr T. Dewhurst, as President of the First Congress, inaugurated the Second Congress and invited the late Colonel Louis Pineau to take the chair as President of Honour.

At this Second World Petroleum Congress, nearly four hundred papers were presented and discussed, about 1,500 technologists were present from thirty-three countries, and twenty-three governments sent official delegations.

Not the least important of the decisions of the Second Congress was that by which a Permanent Council of World Petroleum Congresses was set up to control the affairs of the Congress, and the Secretariat was vested in the Institution of Petroleum Technologists (now the Institute of Petroleum).

As a result of their deliberations, the Council decided that the Third World Petroleum Congress should be held in Nations and perhaps might finally develop into World Empire of Petroleum Technology.

At the conclusion of this First World Petroleum Congress, it was resolved that "*Meetings of the Congress should be held triennially, and that the Institution of Petroleum Technologists should arrange the meeting place of the next Congress, to be held in* 1936."

It soon became obvious that the three-year interval could not be adhered to, and in 1935 a decision was taken to amend the resolution to permit of future Congresses being arranged as and when circumstances were favourable.

It appeared to the Association Française des Techniciens du Pétrole that the occasion of the Exposition Internationale in Paris in 1937 would be a suitable occasion for the Second World Petroleum Congress. Consequently, the A.F.T.P. issued an invitation that the Second Congress be convened in Paris in 1937 and the Institution of Petroleum

G. A. Tuyl Schuitemaker, chairman of the Permanent Council, had good reason to feel pleased with the success of his efforts.

The President delivering his address at the formal opening in the Ridderzaal.

Berlin in 1940, but world events soon after the preliminary announcement had been made rendered that impossible.

During the years of the second world war, when nations were engaged in slaughter and destruction, no thought could be given to world or any other congresses. But hostilities had not long ceased when the petroleum industry felt that the time was approaching when consideration should be given to the holding of a Third World Petroleum Congress in order to discuss the enormous advances in science and technology which had been made since 1937.

The Council met and discussed the merits of various countries as the venue for the Third Congress and eventually an invitation from the Royal Netherlands Institution of Engineers that the third Congress be held in Holland in 1951 was accepted.

Forthcoming Congresses

At a meeting of the Permanent Council held in Holland on June 4, it was definitely decided that the Fifth World Petroleum Congress would be held in the United States in 1959. This would coincide with the centenary of the drilling of the first oil well in the United States by Colonel Drake in 1859.

The Fourth Congress will probably be held in 1955 and its venue will be discussed at the next meeting of the Council.

The Third World Petroleum Congress

The Third World Petroleum Congress was formally opened on May 28, 1951, by His Excellency Professor J. R. M. van den Brink, Netherlands Minister for Economic Affairs, in the presence of H.R.H. The Prince of the Netherlands, the Patron of the Congress, and a large gathering of the delegates. The opening ceremony took place in the Ridderzaal

Left: *Mr and Mrs H. Hyams with G. B. Shea and H. M. Smith, of the U.S. Bureau of Mines.* Centre: *A. Beeby Thompson, a regular attender at petroleum congresses from at least as long ago as 1904, and Mrs Thompson.* Right: *F. R. S. Henson* (Iraq Petroleum Co.), *E. Cooper Scott* (Trinidad Leaseholds), *C. T. Longcroft* (Oil Well Supply Co.), *and Cecil W. Wood* (Petroleum Times).

(Hall of the Knights) and was an impressive and colourful event.

During his address, the Minister said it was not without some pride that his Government recorded that the Netherlands had played a considerable part in the development of the world's oil industry. Early activity was displayed by the Dutch in international activity in all spheres of the oil industry and the Netherlands had long had a share in the exploration and working of oil territories in all parts of the world.

It was because of this that the Netherlands Government showed such interest in the Congress and such appreciation of the choice of the Netherlands as its venue.

The Congress was a manifestation of international co-operation, said the Minister, and he considered it eminently important that it should actively and practically promote such co-operation between the experts from almost every country who were present. He concluded by expressing a welcome to the large number of foreign guests who were in The Netherlands and his hope that they would witness the full achievement of the aims of the initiators of the Congress.

The Palace Hotel, Scheveningen, headquarters of the Congress.

The President's Welcome

Previously, the president of the Congress, Jonkheer O. C. A. van Lidth de Jeude, had welcomed the delegates and had paid a tribute to the late President, Colonel Louis Pineau. He expressed the hope that this Congress would be the forerunner of a long series of Congresses at regular intervals, uninterrupted by wars, marking a period of peace and prosperity.

Most of the technical sessions were held in the Kurhaus, in front of which is the Gevers Deynootplein, gaily decorated in honour of the Congress.

H.M. The Queen of the Netherlands and H.R.H. Prince Bernhardt received prominent members of the Congress at their palace at Soestdijk, in the garden of which this picture was taken.

He was convinced, he said, that these congresses were of the utmost importance for the petroleum industry, which ranked high in the modern structure of the community.

Thanks to the efforts of the experts who were members of the Congress, world production and consumption of petroleum had steadily increased. In 1864, *The Times* had drawn attention to the first application of liquid fuel as a substitute for coal. In 1890, world oil production was 10 million tons, in 1914 it was 55 million tons, and in 1950 over 500 million tons.

Referring to differing estimates of the world's reserves of petroleum, the president stressed the necessity of stimulating exploration and production and of further improving crude oil processing in order to derive the maximum benefit therefrom.

The Council Chairman's Address

The chairman of the Permanent Council of the World Petroleum Congress, G. A. Tuyl Schuitemaker, said it was his proud duty and honour to thank His Royal Highness for his readiness in accepting the patronage of the Congress.

H.M. Queen Juliana and Mr. Tuyl Schuitemaker are seen chatting with the President of the Institute and Mrs. Southwell who were among those present at the Royal reception.

K. Arter and C. H. Sprake. C. S. Windebank (of Esso Development Co.), J. W. Drinkwater (Ministry of Supply), T. K. Hanson and H. L. West (Esso Development Co.), and (right) Prof G. L. Hugel (University of Strasbourg) delivering his special lecture.

He also welcomed the presence on the Committee of Honour of two representatives from the State Department of the U.S.A., a representative of the British Government, and of the French Government. They were also indebted to the Netherlands Government, which not only had several representatives on the Committee of Honour, but had also given every assistance by word and deed.

Mr Schuitemaker also thanked H.E. the Minister of Economic Affairs for officially opening the Congress, and H.E. the Crown Commissioner for the Province of South Holland, and the Burgomaster and Aldermen of The Hague for their support in many fields.

After outlining the organization and results of the two previous congresses, Mr Schuitemaker addressed a few personal words to the delegates, drawing a parallel with Liebig who, in 1822, wrote as follows to his patron von Humboldt when asking him to speak on his behalf to Gay-Lussac:

"*Unknown in a city where the concourse of so many people from all corners of the earth forms the greatest obstacle to closer contact with outstanding scholars and famous scientists, I may live and die unnoticed.*"

He hoped that the young scientists present would come into close contact with the "old guard," and that that contact would bear fruit and ensure the continuity so essential to the development of the industry. He concluded by expressing the hope that the Congress would result in many scientific achievements, in the renewal of old friendships, and in the forging of new ones.

At night the Gevers Deynootplein was brilliantly illuminated.

The Congress Officials

President of the Third World Petroleum Congress was Jonkheer O. C. A. van Lidth de Jeude, president of the Royal Netherlands Institution of Engineers, who was assisted by the following six vice-presidents:

Professor M. Boldrini (Italy).
Professor P. Erculisse (Belgium).
R. Navarre (France).
Frank M. Porter (U.S.A.).
C. A. P. Southwell (Great Britain).
Dr G. Théry-Fombona (Venezuela).

The Organizing Committee was composed of members of the Board of the

Petroleum Section of the Royal Netherlands Institution of Engineers and representatives of the Netherlands petroleum industry, viz.:

G. A. Tuyl Schuitemaker (Royal Dutch/Shell Group), *Chairman.*
A. A. G. Schieferdecker (Bataafsche Petroleum Mij), *vice-chairman.*
J. W. Zwartsenberg (Bataafsche Petroleum Mij), *secretary.*

★

Scheveningen was well sign-posted both officially and by the Congress—so there was no reason for anyone getting lost.

★

J. A. Beukers (Standard Amerikaansche Petroleum Co), *treasurer.*
A. Beydals (Caltex Petroleum Mij).
Professor J. J. Broeze (Royal Dutch/Shell Laboratory).
E. C. Campioni (Standard-Vacuum Petroleum Mij).
Professor R. J. Forbes (Bataafsche Petroleum Mij).
Dr J. Heslinga (Bataafsche Petroleum Mij).

Frank M. Porter (president of the API) *speaking at a press conference. Seated are General E. Thompson* (Texas Railroad Commission), *the originator of the Interstate Oil Compact, and Mrs E. J. Dichter* (Petroleum Times).

Dr J. N. J. Perquin (Bataafsche Petroleum Mij).
Jonkheer H. G. A. Quarles van Ufford (Bataafsche Petroleum Mij).
Dr J. C. Vlugter (Batafasche Petroleum Mij).
W. F. Westenenk (N. V. Comprimo).
H. Sangster (Royal Netherlands Institution of Engineers).

Associate Member:
C. van de Poll (Netherlands Petroleum Board).

The General Secretary of the Congress was J. W. Zwartsenberg and he was assisted by S. E. Dike and Miss T. L. Gordijn, as head of the Reception Office and assistant secretary for Registrations respectively.

Left: *Prof. R. J. Forbes* (Excursions Section), *C. van Dijk* (Editorial Board), *and A. A. G. Schieferdecker* (Technical Organization Committee) *pause for the photographer.* Left centre: *J. A. Beukers* (*treasurer*). Centre right: *J. W. Zwartsenberg* (*general secretary*) *finds a moment for a chat with H. C. Tett* (Esso Petroleum Co.) *and Col S. J. M. Auld.* Right: *W. A. Partridge and C. V. Hill* (Anglo-Iranian Oil Co.).

The audience at one of the technical meetings, all intent upon the speaker and his remarks.

In addition there was an Editorial Board (*chairman*, Dr H. B. J. Schurink), and committees for Technical Organization (A. A. G. Schieferdecker), Press and Publicity (Jonkheer H. G. A. Quarles van Ufford), Hotel Accommodation (G. A. Tuyl Schuitemaker), Excursions (Professor R. J. Forbes) and a Ladies Committee under the chairmanship of Mrs B. Th. W. van Hasselt and the secretaryship of Miss M. M. J. V. Jordaan.

The Headquarters of the Congress was established in the Palace Hotel, Scheveningen, where reception and registration arrangements were in full swing from 10 a.m. on May 26 until the close of the Congress.

The Technical Sessions

The technical proceedings of the Congress were arranged in ten main sections to cover the full range of technical activities in the industry. These sections were:

I. Geology, geophysics.
II. Drilling and production.
III. Physical operations in oil processing.
IV. Oil processes involving chemical conversions.
V. Production of chemicals from petroleum; their properties and application.
VI. Composition of petroleum; analysis and testing; measurement and control.
VII. Utilization of oil products.

Left: *The chairman of the Measurement Section (H. Hyams) addresses his meeting, and* (right) *L. C. Burroughs (U.S.A.) has something to say on the same subject.*

Left: *E. F. E. Howard* (Council of British Manufacturers of Petroleum Equipment) *has a chat with C. E. R. Sams.* Centre: *C. V. Barrow* (Oklahoma Publishing Co.) *who, at a press gathering, proposed the establishment in Europe of a branch of the American Oil Writers Association, and Kenneth B. Barnes* (Oil and Gas Journal). Right: *W. S. Ault* (Shell Petroleum Co.) *and some friends.*

VIII. Construction of equipment; materials, corrosion.

IX. Transport, storage and distribution.

X. Economics and statistics; documentation; education and training.

In all there were about 274 papers presented for discussion and each section was divided into sessions of one or two hours duration, the number of sessions varying according to the number of papers in the section. At each session, the papers were presented in summary by the general reporter (in both English and French) and discussion followed. Each contribution to the discussion was immediately summarized in the other official language (English or French) and the author, or authors, if present were able to briefly reply to points raised.

All remarks at all meetings were automatically recorded on magnetic tape recorders and will subsequently be edited and published in the final proceedings. Authors will also be given the opportunity to reply in full to the discussion before publication.

Space does not permit of a full report of the various sessions and in fact it would not be possible for any one person to make such a report. From frequent visits to the sessions, which were held in the Kurhaus, in the Palace Hotel, and in the Grand Hotel, it was possible, however, to gain a general impression of the proceedings as a whole.

Sessions were generally well-attended and discussion in some meetings was lively and much to the point. The major criticism heard concerning the meetings themselves was the lack of sufficient time for adequate discussion of a subject. The concensus of opinion was that too much time was spent in explaining procedure in two languages and in the translation, however brief, of all remarks into the second language.

At the official cocktail party: Frank Porter chats with some friends, while in the centre the Measurement Section get together (P. R. de Ryckere, L. C. Burroughs, and H. Hyams, with Mrs. Burroughs having a less scientific discussion in the background), and on the right Dr R. Lessing and C. Chilvers have found something to smile about.

Not in a coach, but in a launch on a trip round the canals and harbour of Amsterdam, where—

Special Lectures

During the Congress four special general lectures were delivered at plenary sessions. These were:

"Récents progrés dans la chimie du Pétrole et de ses dérivés," by Professor G. C. Hugel (*University of Strasbourg*).
"The oilfields of the Middle East," by Dr G. M. Lees (*Anglo-Iranian Oil Co. Ltd.*).
"Future aspects of the application of fuels and lubricants," by Professor J. J. Broeze (*Royal Dutch/Shell Laboratory, Delft*).
"Benefits from research to the petroleum industry," by Dr E. V. Murphree (*Standard Oil Development Co.*).

All these lectures were attended by large audiences.

The Banquet

On the evening of May 31, 1,000 of the delegates gathered in the Kurhaus for the official banquet, the concert hall having been transformed into a huge dining hall gaily bedecked with beautiful flowers. The meal was in keeping with the high standard of Dutch culinary art and the speeches, only the main features of which can be given here because of space limitations, were entertaining.

During the dinner the chairman announced that the following telegram had been sent to Her Majesty the Queen of the Netherlands:

"*A thousand members of the Third World Petroleum Congress assembled today, Thursday, May 31, at a banquet at Scheveningen feel the desire to present their respectful greetings to Your Majesty and His Royal Highness Prince Bernhardt of the Netherlands.*

"*The Congress begs Your Majesty and His Royal Highness, graciously to accept the best wishes of its members for the happiness and prosperity of all the Royal Family and for the welfare of the Netherlands and its international interests.*"

P. R. de Ryckere, proposing the toast of "The Netherlands—inviting country" said that during the Congress they had had a unique opportunity of meeting many colleagues engaged in the same problems. He was convinced that when they left that friendly country it would be with a feeling of regret that their discussions had not left enough time to see and admire all the artistic, historic, and folklore treasures of the Netherlands.

Professor M. Boldrini, asking the members to drink to the prosperity of the Netherlands and to the happiness of all present, said it was with genuine emotion that they saw people of every country freely report on their studies and scientific interests.

G. Théry-Fombona, proposing a toast to "*The Organizers of the Congress*," said that such congresses were of great service to all countries attending them,

—the passengers were able to see the tanker Kirkouk which had been launched a few days previously.

At the CBMPE party. Left: *Mr T. Dewhurst with Mr and Mrs J. S. Parker.* Centre: *E. F. E. Howard, C. A. P. Southwell, and V. Butler* (Ministry of Fuel and Power). Right: *Mrs Southwell on the left and Mrs Howard on the right.*

not only for the scientific discussions but for the personal relationships established during the meetings.

Rene Navarre, toasted the ladies and said that their presence at the Congress symbolized among other things the miracles of the petroleum industry, since they "make of perfume a memory, of exaltation make peace, bring light to gloomy days, and of our children make men."

Concluding a speech of great charm, M Navarre said he had ascribed many virtues to the ladies. On looking closer, he could see that those virtues were precisely those of the country which welcomed them. For in the service of humanity, in simplicity and truth, in love of order and decoration, in the paths of service to others and to posterity, where the example of the ladies seemed to sustain them, an illustrious and venerated Sovereign guided her people. Thanking her for the august example which she gave to his demonstration, he concluded "may she therefore accept my humble request that this evening she occupy the first place among the ladies to whom on your behalf, gentlemen, I propose this toast."

Frank M. Porter, said he brought messages of greeting from the American petroleum industry and a number of other organizations in the United States.

The tremendous importance of petroleum in the world today focused the

A small portion of the concert hall of the Kurhaus during the official banquet.

Break for refreshments was always a time for great activity in the foyer of the Palace Hotel.

attention of all men and all nations. Oil was where it was found and no region was too remote or inaccessible to the oil prospector. The energy and resources used in making petroleum products available to consumers were without parallel in industrial history.

There were no boundaries to the technology and research activities of the industry, and, for its accomplishments and achievements and for its determination to preserve the enjoyment of liberty in a free society, he asked them to join in a toast to "The Petroleum Industry."

The concluding speech was by **Mr C. A. P. Southwell,** president of the Institute of Petroleum, who said that in Jonkheer van Lidth de Jeude, they had a man who radiated bonhomie all the time and it was with the greatest regret that he had heard of his indisposition, and he wished him a speedy recovery.

Included in his toast were the vice-presidents and he felt honoured to be associated with those distinguished guests from so many countries. Now, said Mr Southwell, he came to the most honoured part of his toast—the Ladies' Committee, coupled with the name of Mrs van Hasselt, its chairman, which had done so much in organizing visits and hospitality to ensure that the lady visitors were enjoying every moment of their stay in Holland. It was to their benefit that there should be occasions where the softening influence of the ladies should be felt, for when there were ladies present there was "A feast of reason and a flow of soul." Without them there might be "A feast of unreason and a flow of bowl."

He asked them to drink to the Congress, to the return to health of the President, to the health of the vice-presidents, and to Mrs B. Th. W. van Hasselt, chairman of the Ladies' Committee.

All these toasts were received with enthusiasm.

Excursions—industrial and tourist—were very popular as shown by this view of the crowd which always faced the girls behind the counter.

A Royal Honour

During the Congress, Her Majesty the Queen of the Netherlands graciously consented to receive leading members of the Congress organization. About 60 members and their ladies, including Mr and Mrs Southwell and Mr and Mrs Dewhurst, were received by Her Majesty the Queen and His Royal Highness Prince Bernhardt who after the formal reception, talked with their guests in the garden of the palace at Soestdijk. The delightful informalityof this part of the reception is shown in the accompanying photographs.

The Final Plenary Session

On the afternoon of June 6 a large number of delegates gathered in the Kurhaus for the final session of the Third World Petroleum Congress.

Opening the Session **Jonkheer O. C. A. van Lidth de Jeude,** the President, now happily recovered from the indisposition which had overtaken him after the opening ceremony, said that the time had come to reap the harvest. The results of their labours had been summarized in a few resolutions which would be submitted for approval of that Plenary Session.

J. W. Zwartsenberg, secretary of the Organizing Committee, then read the resolutions, which concerned the following subjects:

The Registration Desk for Great Britain where papers, mail, etc., were always ready for collection and accompanied by a pleasant word and a smile.

Dr E. V. Murphree, Standard Oil Development Co., elected chairman of the Permanent Council of the World Petroleum Congress, who took over office at the end of the Hague Congress and will remain in office until the end of the Fourth Congress.

Section I. The study of the regional distribution of sedimentary layers; circumglobal correlations in the Upper Cretaceous and the Tertiary rocks: terms relating to the migration of oil; definitions and analysis of organic matter occurring in geological formations.

Section II. Standardized notations for physical quantities and mathematical functions used in publications; terms used for describing different classes of reserves; procedures for testing casing centralizers and for rating their pipe-supporting properties; specifications for integral-joint casing.

Section VI. The pour point test for black oils; viscosity index; the expression of viscosity in kinematic units; international exchange of fundamental data on hydrocarbons and other compounds; knock-rating procedure.

T. Dewhurst speaking on behalf of Great Britain in appreciation of the Congress organization at the Final Plenary Session.

Section VIII. U.S.A. participation in the International Institute of Welding study group on pressure vessels, boilers, and pipelines; collaboration between producers, manipulators, and users of construction materials.

Section X. An international vocabulary on the petroleum industry; mining legislation for hydrocarbons in different countries.

At the conclusion of the reading of these resolutions, **Jonkheer van Lidth de Jeude** said he was glad the resolutions had been adopted.

He then expressed their heartiest thanks to all who had contributed to the success of the Congress—to H.M. Queen Juliana for her charming reception of Congress representatives, to H.R.H. Prince Bernhardt, for his patronage of the Congress, to the ambassadors of various countries, to the Ministers of Foreign Affairs, of Economic Affairs, and of Education, to the Governor of the Province and to the Burgomaster of The Hague, to the Committee of Honour and the vice-presidents, to the Ladies Committee, to the Press, to the Caltex, the Standard-Vacuum, the Standard A.P.C., the B.P.M., Messrs van Leer, and many other donors, to the Organizing Committee, to the Sectional Committees, and to all who by their enthusiasm and energy had been the backbone of the Congress.

Before calling on Mr Tuyl Schuitemaker to address them, he availed himself of the opportunity of thanking him for the enormous amount of work he had done in his capacity also of chairman of the Organizing Committee and as acting-president of the Congress.

G. A. Tuyl Schuitemaker, chairman of the Permanent Council of the World Petroleum Congress, said that the Council would study the resolutions which had just been adopted. Appropriate steps would be taken to deal with their practical applications or to bring them to the attention of the proper authority.

He wished to inform them of the following decisions taken at the meeting of the Permanent Council on June 4:

Left: *A merry group at the CBMPE party.* Centre: *Hydrogenation—Dr C. M. Cawley* (Fuel Research Station), *W. C. Schroeder* (U.S. Bureau of Mines), *and Dr C. C. Hall* (Fuel Research Station). Right: *C. J. Krom, S. L. Langedijk, and E. Eisma* (Royal Dutch/Shell Laboratorium, Amsterdam).

The Institute of Petroleum corner in the Palace Hotel. It was here that many old friends came to sign a special message to Dr A. E. Dunstan.

1. Mexico has been elected as a new member of the Council;

2. The Council will consider the inclusion of Spanish as the third official language of the Congress;

3. Dr E. V. Murphree (United States) has been elected as chairman of the Council for the ensuing period until the end of the next Congress;

4. The following executive officers have been elected: Perez de la Cova (Venezuela), S. Scheer (France), G. A. Tuyl Schuitemaker (The Netherlands), C. A. P. Southwell (Great Britain), as vice-presidents; and Col S. J. M. Auld (Great Britain) as honorary treasurer.

Addressing the President, Mr Schuitemaker regretted that the state of his (Jonkheer van Lidth de Jeude) health had not permitted him being present throughout the whole Congress. In him they also honoured the Royal Netherlands Institutions of Engineers, the Petroleum Section of which had both inspired and focused their efforts to make this gathering a success. He had inspired them throughout the Congress and Mr Schuitemaker expressed the thanks of the Permanent Council and of them all to the President for his efforts.

Jonkheer O. C. A. van Lidth de Jeude said he was sure they had all been impressed by the cordiality and mutual understanding which had marked their meetings.

America was strongly represented at the Congress. Here we see E. E. Bullard (Stanolind Oil and Gas Co.), *Frank M. Porter* (API), *F. S. Clulow* (Shell Oil Co.), *and L. Hagy with R. P. Bolton* (Italy-Malta Standard Oil Co.).

Nobody could foretell the outlook of the world in the next decade or what problems would have to be faced. He hoped that future generations would look on the efforts of the present generation with appreciation of their achievements and would recognize that

At the cocktail party given by the British National Committee. Left: *Mrs H. C. Tett on left with Col S. J. M. Auld, H. Hyams, and Mrs T. Dewhurst.* Centre: *Mrs C. A. P. Southwell with Mr Tuyl Schuitemaker and* (second from right) *T. Dewhurst.* Right: *Mrs E. B. Evans, Mrs H. Hyams, Mr Schuitemaker and Mrs S. J. M. Auld.*

G. A. Tuyl Schuitemaker speaking at the luncheon to the National Committees and general reporters on May 28.

their ancestors had done their utmost to serve the community to the best of their ability.

Eight speakers then expressed on behalf of their delegations, their gratitude for the hospitality of the Netherlands and their appreciation of the organization of the Congress. The speakers were R. Navarre (*France*), Manuel Rodriguez Aguilar (*Mexico*), Prof Ernst Terres (*Germany*), Necdet Egeran (*Turkey*), T. Dewhurst (*Great Britain*), Prof F. Malschaert (*Belgium*), Prof Carlo Padovani (*Italy*), and Dr K. G. Mackenzie (*United States*).

The President then declared the Third World Petroleum Congress closed.

Thus ended a Congress which will live long in the memories of those who were present. Membership registration was at least 2,800, including some 700 ladies, and established a new record for petroleum congresses, at least outside of the United States. Nationals of over thirty countries were present at the Congress. The residents of the Netherlands were kindness itself and their hospitality did much to add to the enjoyment of the visitors. Language difficulties were negligible and even on those few occasions when misunderstanding seemed likely, there was always a Dutchman at hand who straightened the matter out with a smile. And the weather was kind, although a hot sun was tempered by a north wind.

★

During the reception given by the Municipal Council of the Hague, the ladies were entertained by an exhibition of old Dutch costumes.

★

Last, but by no means least, a special tribute must be paid to the ladies of the Congress staff—those patient girls at the registration and reception desks who served out masses of documents and mail, and settled all sorts of queries, always with a smile and a pleasing word.

As the Congress drew to its close a farewell party was given by the B.P.M. at "Avifauna." A few of those present: E. R. Blane (right side of left-hand photo), *Prof H. I. Waterman, R. Stansfield, and G. L. Hancock* (centre photo), *and B. H. Moerbeek and C. W. G. Martin* (right photo).

They took the sting out of queueing, particularly in the early days when everyone was trying to do the same thing at the same time. And a special word of thanks to the staff of the Press Office who did so much to make this account possible.

Social Functions

So far this account has dealt mainly with the business end of the Congress, but something must be said of the social aspects of the gathering.

Perhaps the most important part of any congress is the opportunity it gives for personal contact, the renewal of old friendships and the making of new friendships.

At the Third World Petroleum Congress there was ample scope for such meetings, at lunches, dinners, and at the many parties both official and private.

Thus, on the evening of May 28 the Organizing Committee invited all members to a cocktail party at the Palace Hotel and provided the first occasion for getting together, although it was somewhat crowded.

On May 29 the Government of the Netherlands held a reception at the Kasteel Oud Wassenaar. Here indeed was hospitality on a grand scale with little formality. Various Ministers of the Netherlands Government were present to receive the guests in this castle, set in beautiful grounds through which guests could roam at will or could engage in conversation with the Government representatives.

Next evening the Burgomaster and Aldermen of The Hague held a reception for members of the Congress at the Witte Club. During the evening there was a special show of old Dutch costumes for the ladies, the costumes coming from the collection of Mr Cruys Voorbergh.

For those who were unable to be accommodated at the official Banquet on May 31, there was an International Cabaret in the Theatre Royal in the Hague.

Friday and Saturday were in effect business with pleasure days for a series of industrial excursions had been arranged, and in most cases the industrial part of the trip was combined with a visit to some place of interest or beauty.

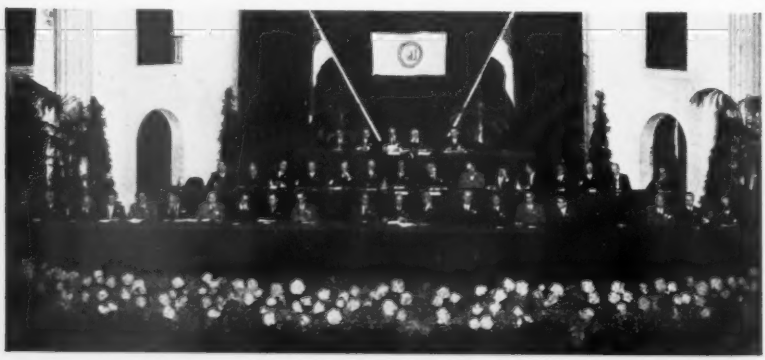
The last official social function was the farewell party given by the N. V. de Bataafsche Petroleum Maatschappij

The staff, all of whom did a good job of work and never failed to answer the countless questions with a smile.

As a small token of appreciation the members of the Ladies' Committee were presented with flowers by the lady visitors who had so much enjoyed the arrangements made on their behalf.

(Royal Dutch/Shell Group) to all members of the Congress on June 5. The scene of this party was Avifauna, the bird sanctuary at Alphen-on-the-Rhine, the guests being conveyed by coach and private car. The three dance floors, which included one with Geraldo and his B.B.C. orchestra, were soon crowded with dancers, while a delightful interlude was provided by the Ballet der Lage Landen, who performed ballet on the side of the lake which was tastefully illuminated by coloured lights. Others preferred to wander around and view the feathered inhabitants of Avifauna.

In addition to these official parties there were numerous private receptions. For example, the Council of British Manufacturers was "at home" to its guests on the evening of June 1, the Organizing Committee gave an informal lunch to the National Committees on May 28 and a cocktail party in the evening, and the British National Committee entertained the Organizing Committee on June 5, while the Press were the guests of the Press and Publicity Section at lunch on May 29.



The Third World Petroleum Congress closes. The scene on the platform during the Final Plenary Session. On the top table were the president, three of the vice-presidents, and the general secretary. At the middle table were the members of the Permanent Council, and at the lower table the Organizing Committee and the chief rapporteurs.

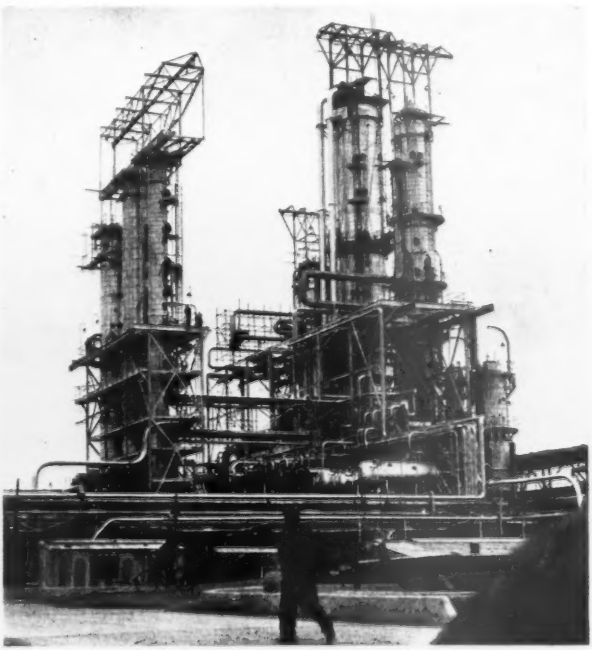
Meanwhile, the ladies had not been left to their own devices—a tea party on May 29 and excursions daily to such places as the flower centre of Aalsmeer, the vegetable market at Poeldijk, the gold and silver factory at Voorschoten, the cheese market at Gouda, to Alkmaar, Elam, and Volendam, etc., etc. The ladies were unanimous in their appreciation of the very excellent arrangements made on their behalf.

Conclusions

The foregoing account of the Third World Petroleum Congress is in no sense a full record of all that happened during the period May 28-June 6, 1951. Nothing has been said or can be said in the space available concerning the papers themselves or the actual discussions. Those who were unable to attend the Congress itself must await the publication of the full proceedings for these details—and incidentally, those who wish to receive the Proceedings at the reduced rate must apply before September 1, the total cost (including carriage) for the eleven volumes being Fl. 126.50 for paper binding and Fl. 184 for cloth binding.

The photographs accompanying this article were mostly taken either by the Congress official photographer or by the Editor.

CONGRESS PHOTOS: Members wishing to have copies of the photos taken by the Editor during the Third World Petroleum Congress should apply to him at the Offices of the Institute. Prices $\frac{1}{4}$*-plate* ($4\frac{1}{4}'' \times 3\frac{1}{4}''$) 1*s.* 6*d.;* $\frac{1}{2}$*-plate* ($6\frac{1}{2}'' \times 4\frac{3}{4}''$) 2*s.* 6*d.; post free.*



This second crude distillation unit came on stream at the Stanlow refinery of "Shell" Refining & Marketing Co. Ltd. in June. Large extensions begun in November 1949 are due for completion in January.

ESSO PETROLEUM NEW DIRECTORS

Leonard Sinclair, M.Inst.Pet., has been elected chairman and managing director of Esso Petroleum Co. Ltd, in succession to the late Mr R. A. Carder.

Leonard Sinclair

Mr Sinclair has served Esso Petroleum Co. since 1908 when, at the age of 13, he joined the company's Manchester office as a clerk. In 1943 he was appointed a director and was made a managing director in 1949.

It is also announced that **W. E. Jenkins,** C.B.E., M.Inst.Pet. and **N. F. Myers** have been appointed managing directors, and **H. C. Tett,** B.Sc., A.R.C.S., D.I.C., F.Inst.Pet., has been appointed a director.

Mr W. E. Jenkins joined the company in 1920 and was appointed a director in 1945. He was awarded the C.B.E. in 1949 for his services as Controller of the Finance and Accounts Division of the Petroleum Board during the last war.

W. E. Jenkins

Mr N. F. Myers is an American and a graduate of the Massachusetts Institute of Technology. He was appointed a director in 1950 and is primarily concerned with the construction and operation of the new Esso refinery at Fawley.

Mr H. C. Tett was formerly managing director of Esso Development Co. Ltd. before being appointed general sales manager of Esso Petroleum Company in 1949. He is an Associate of the Royal Colllege of Science where he undertook research on combustion and T.E.L. for the Air Ministry, and a vice-president of the Institute of Petroleum.

H. C. Tett

Simultaneously with these appointments, it is announced that to administer the broad policy of the company's rapidly expanding activities in British oil refining and marketing, an Executive Committee has been formed. Its members will comprise the chairman, the managing directors, and one of the other directors who will serve on a rotational basis.

Succeeding Mr Tett as general sales manager is **R. J. Pinder,** M.Inst.Pet., who has been deputy general sales manager since July 1950. Mr Pinder joined the company in Birmingham thirty years ago and remained in the Midlands area until 1930. During the next seven years he was successively in London, Exeter, Cardiff, and Liverpool. In 1937 he was transferred to the International Association Petroleum Industry Ltd. as an executive assistant and rejoined the company in 1945.

R. J. Pinder

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MODERN TECHNIQUES IN PETROLEUM TESTING

I. DISTILLATION—continued

Types of Laboratory Distillation Apparatus and Their Use in Petroleum Testing

In the petroleum industry a batch distillation of standardized nature is employed as a control test for a continuously operating plant column; this factor alone involves a certain reorientation of approach. A continuous column only produces two products if operated for maximum separation efficiency; taking off side streams, which used to be very popular twenty years ago, is less frequently adopted nowadays in high efficiency columns since it removes reflux from the plates below. The laboratory column may be used for two main purposes, analytical or preparative. In the first case it produces information which is of value to the plant operator or designer. Such information for example may tell the plant operator that whereas six months previously a certain separation was being maintained between overhead product and residue, now this separation has decreased. The preparative method is used, e.g. when it is of importance to discover more precisely what materials are present in a specified plant stream, and samples are required for closer analysis by chemical methods. The separation that can be achieved by a packed column is the result of a considerable number of factors; not only the efficiency of the packing but also the reflux ratio, the accuracy of jacket temperature control, the operating hold-up in the column, and the hold-up in the condenser at the top of the column are all important.

When carrying out a batch distillation there will be a number of successive fractions taken off overhead as shown in Fig. 1. Except in the simplest case there will be an intermediate cut of a certain magnitude, dependent upon the degree of purity required of each fraction. To give a specific example, a mixture of benzene and toluene was distilled in a column equivalent to 11 theoretical plates. Although there is a temperature difference of 30°C between the boiling points, yet if benzene and toluene of 99.9 per cent purity are required, the intermediate fraction would account for 55 per cent of the charge[18]. Often the mental transition from dealing with continuous columns to batch distillation columns (i.e. analytical distillation) is made so rapidly and so unconsciously that the importance of this intermediate material, which does not appear as such in a continuous column, is not appreciated.

Further, it is not always realized to what extent the separation obtained in a batch distillation depends upon the hold up[19]. Thus it is possible by increasing the length of a column to increase the hold-up to such an extent that the yield of desired material will decrease and the quantity of intermediate increase.

Practical Applications

Still

Fig. 7 shows a typical example of a fractionating column and ancillary apparatus which can if necessary be used for vacuum distillation. The column has an efficiency of about 30 theoretical plates and although fractionation systems giving 100 theoretical plates are in common use this assembly is one that has been used with satisfaction and illustrates some of the points to which attention must be paid in designing such a system. In this particular case the still is a 1 litre round bottomed flask with a thermowell and a ground glass joint at the side for

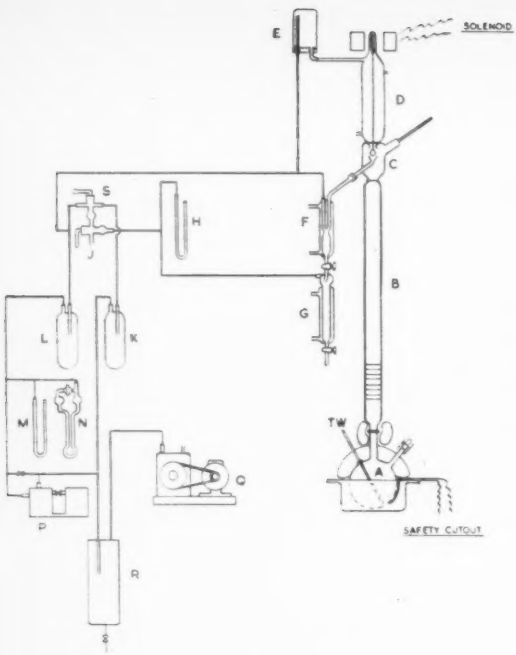

Fig. 7.

removing residues by sucking them out at the conclusion of a run. Heating is done electrically by resistence elements incorporated in woven glass pads and the column is shielded from effect of draught or changes in atmospheric temperature as far as is possible. This is a point of considerable importance if steady conditions are to be maintained. A safety device in the form of a thermo-couple between flask and heater, arranged with a relay so as to cut off all heat if a specified temperature is exceeded is helpful. The column is joined to the flask by a ground joint; opinions vary as to the desirability of such a joint; many laboratories prefer to employ a single construction so that the column and flask are one piece. The advantages of having a ground joint are that dismantling is easier and the column can be employed in a semi-technical plant area, whereas one piece construction means that a glass blower must be employed for all repairs. One disadvantage of the separate construction is that independent support must be provided for column and reboiler heater; these are not indicated on the diagram, but due allowance must be made in erection for thermal expansion.

The method of applying the heat to the boiling liquid can be simple or complex: the simple round bottomed flask is most widely employed, and if the system shown is used a broken flask rarely leads to a fire. Many laboratories employ indirect heating by a hot air bath, electrically heated, but in the case of a cracked still, these may nevertheless explode. The use of a hot wire inside the flask is frequent, and has the advantages of rapid response and excellent promotion of bubble formation, but with reactive petroleum products there is considerable danger of polymerization on the hot surface. Circulation of the contents of the still is sometimes employed using the type of heater shown in I.P. 96.

Lubrication of the ground joint between flask and columns is frequently difficult as the effect of temperature and pressure is to squeeze out lubricant film and then allow the glass surfaces to seize. A variety of materials are described in the literature for sealing such joints: among the more successful are the use of suspensions of graphite and

silicone greases[20]. For a very large number of purposes, however, petroleum-based greases or petroleum-rubber jelly are quite successful.

Column

The column illustrated is a perforated plate type with a vacuum jacket so that no electrical heating is required to ensure adiabatic conditions[21]. Perforated plate columns have two advantages, in that they have a wide operating range without becoming excessively in efficient and they can be washed out with hot chromic acid or hot nitric acid to remove the gummy materials so often deposited after distilling cracked petroleum products. A considerable number of packings have been developed recently but it may be helpful to supplement, from the purely practical point of view, some of their salient features. When handling cracked petroleum products, which may include dienes or reactive sulphur compounds, it must be borne in mind that metal surfaces may often catalyse polymerization, particularly in the presence of any dissolved air and an inert metal should be chosen if this is possible. Increasing amounts of chemically reactive materials are produced in the refinery and whereas previously these were removed by an acid wash or a clay treatment, they are now recovered where possible.

Fenske helices or loose glass packings suffer from the disadvantage of being so fragile that they break in service and may clog the column. This will increase pressure drop through the column, it may also increase hold-up; Fenske helices in stainless steel do not suffer from this disadvantage.

During recent years a number of metallic column packings have been developed[22-25] and their efficiency in terms of H.E.T.P. is considerably superior to any glass packing.

Another matter that must be considered in the decision as to what packing should be employed is the operating hold-up. This factor is not of importance on a continuous column in the plant and is usually of relatively little importance in a semi-plant scale continuous column but on a laboratory batch distillation it can be of over-riding importance and affect seriously the yield of pure product obtained[26]. Certain types of packing, e.g. perforated plates, can drain after the completion of a distillation and have a minimum static hold-up. Where a material balance is required on a laboratory distillation the static hold-up has to be included with the loss figure and thus represents an area of uncertainty. These factors also apply to the condenser and reflux separator where a minimum hold-up is again of considerable importance, a point not always appreciated in pilot plant work. Thus, even though a column packing has a high efficiency expressed as the number of theoretical plates per foot length, it may still be unsuitable for normal laboratory practice. Or again a large box weir-type reflux proportioner may completely outweigh the efficiency of the column proper and make the production of large quantities of intermediate materials inevitable.

Flexibility in use is another major factor. If solids must be distilled such as wax or naphthalene, packing must be chosen so that blockages will not occur. Thus a long Vigreux column may be better for this purpose than a short packed column.

Column Insulation

The ideal column would have adiabatic walls so that no heat would pass in or out. In practice two main choices exist:

a. Reduce heat losses,
b. Compensate for heat losses.

A good vacuum jacket is the simplest approach[27], but relatively few are made in the U.K. With such a jacket there is no need to install accurate temperature compensation devices and the whole column installation is simplified.

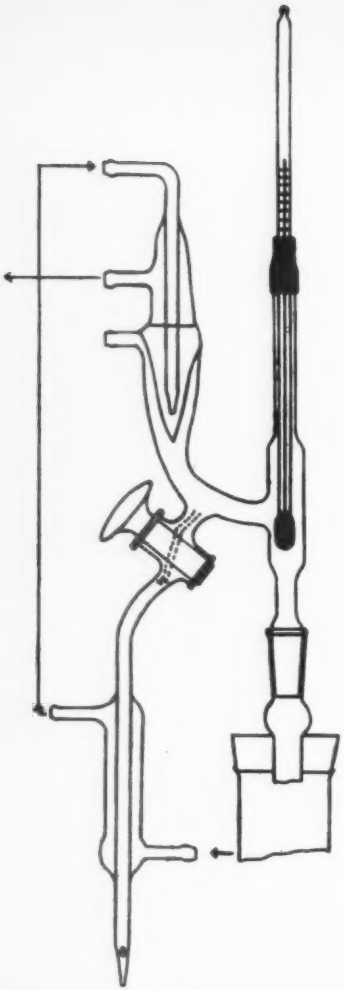

Fig. 5

Failing a vacuum jacket, simple lagging can be a useful substitute but heat compensation is to be preferred. Resistance wire wound on a glass tube with an air gap between column and jacket is the most usual form but hot oil jackets are also used, and resistance windings on metal tubes with lagging between hot tube and distillation column as well as outside the hot tube. Theoretically the temperature of the inside of the jacket should be just equal to that inside the distillation column, which means that the jacket must have a temperature gradient from still to column head. One of the disadvantages of the glass tube-air jacket heat compensation is the fact that the hot air rises and affects the temperature gradient, but this is usually a minor effect.

Column Head

The reflux divider illustrated in Fig. 5* is a simple divider and the illustration should be taken as schematic only, a better design being shown in Fig. 8. There is much to be said for a simple

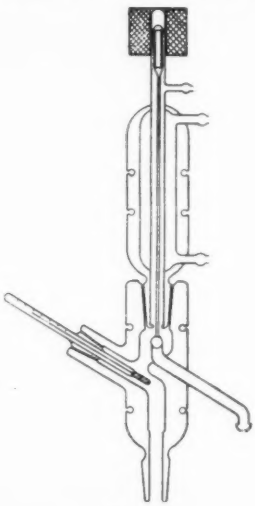

Fig. 8

tilting funnel type reflux divider in that it is simple, very reliable in operation and has a small hold-up. For increased accuracy, particularly when working at high reflux ratios the advantage lies with a vapour type divider and a num-

*NOTE. This figure was inadvertently printed upside down in the first part on page 216.

ber of designs have been described in the literature[28, 29].

The chief practical disadvantage of most liquid dividing heads is that with intermittent product offtake there is a tendency for condensation to take place in the liquid collecting line. Consequently, at any specific reflux ratio, say N, the actual reflux ratio will be $N - \delta N$. With the vapour divider type, trouble is frequently experienced with the valves sticking or leaking. These valves are usually made of glass since the petroleum products and chemicals which have to be distilled make very stringent demands on corrosion free materials and glass has proved in the main to be most satsifactory. The situation may be radically altered by the availability of polytetrafluorethylene (Fluon) which is now available in the U.K.

Many laboratories prefer to employ a timing device which actuates a solenoid in the place of modified taps or orifices for maintaining reflux ratios above say 15: 1. The main advantage of such automatic timers is their constancy of operation and the fact that they require a minimum of supervision. In such a case the reflux ratios will be given by

$$\text{R.R.} = \frac{\text{time (seconds) off take valve is shut}}{\text{time (seconds) off take valve is open}}$$

Opinion is still divided on whether intermittent take off enables superior fractionation to be achieved and considerable evidence has been quoted on both sides[30].

Using a battery of columns equipped with electrical heating of the pot, jacket heaters and automatic reflux recorders, it is quite within the capability of one operator to manage three columns depending on the complexity of the distillation, the degree of refinement of the column controls and the intelligence of the operator. Frequently with highly instrumented arrangements working at low take off rates this figure can be increased to 5 or 6 columns, illustrating a considerable reduction in manpower as against normal practice in 1940.

Variable orifice reflux ratio controllers are cheap, simple and robust but can give results that are seriously in error if a small amount of foreign matter, e.g. lubricant from a ground glass joint, should be washed into the take off lines. When a vapour divider of the type illustrated is employed, it is essential that care must be taken to avoid pressure drops anywhere in the overhead system and in this particular case a pressure equalizer is shown between the top of the overhead condenser and the line to the vacuum pumps. Frequently it is annoying to find water condensing from the atmosphere on the outside of the product receivers and on such occasions an outside vacuum jacket is a refinement that is much appreciated by the actual column operators. An overhead vessel (E) is provided for the occasions when a boil over takes place: though it does introduce a few more joints into the vacuum system, it is well worth while as an insurance. The type of receiver system (F, G) illustrated is one that has proved convenient in use, but there is ample scope for personal taste in this matter. The remaining equipment to the left of the line (E, F, G) is for operating under vacuum. H is a mercury manometer of the Torricellian type, i.e. with sealed end, for use when working in the range from 50mm to 1mm. The rest of the equipment is straightforward. N is a differential manometer which is of use for checking on the performance of the vacustat. When the vacustat P is brought into operation at its correct setting, the valve on differential manometer N is opened and then closed. When there is no differential pressure showing on this manometer the column is at control setting.

A large number of pressure regulators or manostats have been designed to maintain a constant vacuum[31, 32]. Manostats using a controlled leak often

give trouble owing to the constant passage of air dissolving in the oil in the pump and reducing the efficiency. Electrically operated manostats require protection against fouling of the contacts[33]. A very simple type of regulator which requires no outside power or electricity for operation is the Cartesian-diver[34]. These Cartesian-divers are simple, robust and can easily be repaired. Provided an accuracy of regulation of 1 mm of mercury is adequate they will be found very effective.

Boil-up Rate

It is often valuable to be able to measure the boil-up rate on a column designed for analytical distillations and the apparatus for the distillation of crude petroleum (I.P. 25) shows a simple device for this purpose. The rising vapours ascend through the central tube and the descending liquids pass through the hole indicated which can be closed by a steel ball bearing; in this way the condensation rate can be measured when the column is steady.

It may be of some value to describe typical instructions to the operator for the use of such a column as frequently there is an air of unreality in discussing analytical columns and it must be emphasized that an analytical distillation, say of a 1 litre sample, may require something like 36 to 300 hours continuous operation. Analytical distillations can be performed in a variety of ways. However, if a good technique has been achieved then there will be a considerable degree of reproducibility in spite of variations in the actual methods employed. Referring again to Fig. 2*. increasing the efficiency of the column would make the vertical portions of the analytical distillation graph steeper, but if the cut points are fixed then the difference in yields of the two major "flats" would be affected to a secondary extent. From the preparative aspect there would have been a considerable improvement but as far as the results of analysis are concerned the change would be less marked. It is this which accounts for the reproducibility of results in spite of divergencies in operation that would ruin the accuracy of some analytical tests.

* See Page 212.

TYPICAL INSTRUCTIONS TO OPERATOR FOR A DISTILLATION AT ATMOSPHERIC PRESSURE

Clean and dry column to be used, make certain that all taps are lubricated. The cleaning of the column may be either a simple process using a light spirit and drying by putting under vacuum, allowing clean air to sweep in, or it may require washing with a sequence of solvents or even strong acids. It is essential that joints and taps are checked for lubrication before a distillation as an interruption in the course of the analysis wastes time and sample.

Prepare cold traps and attach to the take off condenser and column head vents, i.e. L and K. (Fig. 4*.)

Weigh the flask with ring and cork and record in log book the tare weight. (This is one arrangement used for supporting the flask while weighing. It is frequently advantageous to put distillation results both as volume percentage and weight percentages since refinery operators are usually interested in weight balances, whereas for analytical purposes volume percentages are adequate.)

Pour sample into the flask while flask is on the balance until the required gross weight is reached.

Connect flask to bottom of column and place the electric heating mantle in position.

Clamp the joint between flask and column bottom to the frame and tighten the spring under the heater platform to ensure that the ground glass joint is adequately compressed.

Switch on the still heaters and allow charge to boil and reflux evenly over

* See Page 214.

the entire column. Adjust still heater controller so that column is operating at the desired boil up rate. Read the column head temperature at 15 minute intervals.

Let the column stand on total reflux until the column head temperature is steady. (This will be a matter of some hours varying from 2 to 15 when dealing with columns of from 30 to 100 theoretical plates.) Set the reflux controller to the desired ratio.

Take off fractions of 1 per cent volume of charge; just before withdrawal of the fraction read the column head temperature, recording it on the log sheet.

Add contents of cold trap to each fraction as it is removed from the receiver.

Weigh and check volume of each fraction.

Record the refractive index of each fraction on the Abbé refractometer at 20°C. Plot the boiling point and refractive index of each fraction against percentage weight of charge.

At the conclusion of the distillation put the reflux ratio controller on total reflux, turn off heat, cool the flask with air. When the flask is cool remove, weigh and take specific gravity of the residue. Make a weight balance on the distillation.

Vacuum Distillations

The instructions given above do not apply to a metallic gauze packing for which preflooding is a necessary forerunner; they cover a simple distillation at atmospheric pressure and the instructions given would prove adequate, say, for the distillation of a petroleum naphtha or the type of material shown in Fig. 2*. When a vacuum distillation has to be performed, attention must be given to the pressures at which it is desired to operate, thus 760, 100, 15 and 2 mm, form a useful range but the aim must be to achieve the minimum upset to the system and reduce the expenditure of time that inevitably follows a change in pressure. If the pressure is lowered too quickly a boil over will take place but if on the other hand the column has drained before reducing pressure, i.e. by cutting off the heat for too long, then the column will have to be brought into equilibrium again at its lower pressure, consequently, there must be a balancing of the time required to reduce pressure for each stage against the time spent by reducing the number of low pressure stages to a minimum and coming down to a low pressure and low throughput as soon as possible. Modern belief is that the reduction in efficiency consequent upon reduction of pressure is in fact less than has been anticipated[35]. In spite of the fact that the vapour velocity can be increased under vacuum, the rate of distillation must decrease from the reduction in density of the vapour; consequently it rarely pays to have more than three operative stages or pressure levels and in fact two is to be preferred if possible.

* See Page 212.

Special Columns

One notable field of advance in the last ten years has been with micro and semi-micro columns. Since an analytical distillation may require 2 to 7 days, one obvious way of reducing the time is to decrease the size of the charge to the still: this in turn necessitates a reduction in the column hold-up. Rotary columns show this advantage over normal columns.

Rotary Columns

These all utilize a spinning member inside a stationary column and the contact of liquid and vapour is effected by the turbulence in the annulus. The rotating member may be a strip of metal or a closed drum[36, 37, 38]. Since there are no trays and since the rotating element drains easily, the hold up is very small and quite high efficiencies measured as H.E.T.P. can be achieved. In effect the liquid is mainly distributed on the column wall and the turbulence of the vapours in the annular space

promotes the contact. When using a spinning drum, if the annulus is made so small that the vapour flow changes from streamline to turbulent, the theoretical plates per centimetre increases rapidly as suggested by Westhaver[39].

Another great advantage of rotating columns is the fact that the pressure drop is so small and consequently they have been used extensively for work under reduced pressure, as shown by the National Bureau of Standards in the United States[40]. The chief points requiring attention, are leakage at the gland under vacuum, and temperature control. Departure from adiabatic conditions becomes of much more importance in handling a total still charge say of 10 ml as compared with a still charge of 500 ml. Particularly at the junction of still pot and column or column and reflux head, slight heat loss or over correction for heat loss will vitiate the results obtained and make repeatability of an analytical distillation almost impossible.

Micro Distillations

Micro fractionations in the sense of the distillation of less than 1 ml of material cannot be dealt with here but Vigreux columns are supplied by various manufacturers for handling quantities of the order of 10 ml. The take off head is a point on which particular attention must be focused with any of these small columns since obviously liquid hold up at this point will mean that the temperature indicated will not correspond to the material collected. The technique of using these small columns is not easy since both design and operation requires scrupulous attention if erroneous results are to be avoided. The problems of maintaining the correct temperature gradient in the column, and of determining accurately the reflux ratio are much greater than with larger columns, for the same reasons as with the rotating columns. Considerable ingenuity has been exhibited in the design of these semi-micro columns since this is a field where individual preferences play so large a part[41]. A further point that is not always realized when working with these small columns is that owing to the tiny quantities of heat carried by the vapours and the relatively unfavourable ratio of the mass of equipment to column throughput, the period of time to reach equilibrium may be just as long as on a column with a charge ten times as great. With the entrance of the oil companies into the chemical industry, the need to work on smaller quantities of material has become more pressing and further developments in the direction of small scale distillation may be expected.

Continuous Columns

So far most of the work mentioned has dealt with batch distillation columns. The vast majority of distillation columns in a refinery operate continuously; that is to say, feed is pumped into a column at an intermediate point while material is simultaneously removed from the top and bottom, and possibly from other selected points as well. The temperature and pressure at top and bottom remain constant, automatic controls playing a large part in achieving this result. One of the interesting developments of the last few years has been the ability to run small continuous columns. These are used mainly for preparative, rather than analytical work, so they will be discussed briefly. There are several advantages to be gained by carrying out continuous distillations[42, 43], particularly when a high boiling component is required, as in these cases the material can be obtained in a high state of purity in a short period of time, whereas with a batch distillation it would be necessary to distil off the greater part of the material before arriving at the desired constituent. Further, when dealing with materials which are sensitive to heat, e.g. materials containing large di-olefin contents or exhibiting

a high degree of unsaturation, a continuous column subjects them to elevated temperature for only a short period of time, whereas a batch distillation cooks them for days. The main credit for this development must be given to improved instrumentation. Certain kinds of continuous column operation can be achieved quite successfully by manual control, but when one is operating in the region of high accuracy fractionation, say 25 to 100 theoretical plates, it is necessary to maintain very steady conditions. The fluctuations in heat input, flow rate, etc., which are almost inseparable from manual operation, become of considerable importance when dealing with a column of 1 inch diameter.

A constant feed rate can be achieved through a Mariott bottle or other constant pressure head device with a single manual setting for the actual flow rate. Of more accuracy, if the expense can be justified, is the use of a small metering pump, or a flow meter in conjunction with an automatic flow controller. In the United States, columns of 2 cm diameter are operated with orifice type flow meters working in conjunction with pneumatic transmitters to control automatically valves of extremely fine dimensions. The accuracy of the orifice meter and the precision of the manufacture of the needle control valve must both be held within extremely fine limits.

The feed should be pre-heated and this can be done by steam jacket, oil bath or an electrical resistance winding on a stainless steel tube. As the flow is steady the heat input here can be controlled by a relatively simple means. In the column, adequate free space must be allowed at the point of entry to avoid creating a zone of disturbance.

In the simplest case the reboiler can be a simple glass flask as employed for a batch distillation but with a bottom take off flowing through a syphon breaker and cooler to the bottom product receiver. In practice we find that a certain degree of refinement is repaid many times in ease of operation. The greater the degree of circulation in the reboiler the more chance of obtaining steady column conditions and regular vapour evolution.

Directions of Advance

In conclusion it is worth while looking at some of the lines along which advances are probable during the next decade.

The efficient use and ease of manipulation of fractionating columns has been much facilitated by improvements in the delicacy and accuracy of instruments for controlling their operation and further developments in this direction seem likely. An important outcome of these improvements is that a less skilled operator is required for running the columns.

The application of continuous analysing instruments to the top product from a distillation column will probably become more widespread so that the maximum amount of information is available on completion of the distillation run. Further, the tendency to put all these control tests on an automatic basis will be enhanced so that perhaps in the near future one will prepare the sample, put it in the apparatus and later tear off a strip of paper on which all relevant data are indicated in the form of a graph or punched card.

Improvements in the technique of fractional distillation of small quantities of material may be expected particularly when the mechanical difficulties with columns of the spinning band or spinning drum type have been overcome.

Our knowledge will be extended very considerably into the range of non-ideal mixtures as very considerable dividends have already been paid by extractive and azeotropic distillation. As indicated, these specialized distillation techniques are employed chiefly for obtaining certain specific materials in a high state of purity, usually materials boiling

below 250°C at atmospheric pressure. As time goes on, our knowledge of the constitution and structure of materials boiling above the gasoil range will increase and suitable analytical techniques will be developed to assist in obtaining this information. The installation of catalytic cracking plants in this country will emphasize this line of development. At the moment there is little agreement on analytical distillations in the range of lubricating oils and waxes and there are obvious drawbacks to existing pieces of equipment, e.g. the Peterkin apparatus for the distillation of waxes. In Russia it is interesting to note some attention has been directed to this subject[44]. Steam distillations are not, in general, carried out with the same accuracy as vacuum distillations, but if this were remedied they would provide an alternative for dealing with heavy materials.

Finally, attention should be drawn to certain ways in which distillation is being replaced by other techniques. The importance of the time factor has already been referred to and the reason for the emphasis on the use of other analytical techniques is that they often give the same information as an analytical distillation but in a much shorter time. Thus for example, infra red analysis of a simple hydrocarbon mixture may give a result as to the degree of contamination with some undesired material in a matter of 15 minutes, whereas to isolate that material by distillation would be a matter of hours or days. At the present moment, however, the background information for this to be done is only available in a limited number of cases. The two main instruments which will then replace distillation in a laboratory will be the mass spectrometer and infra-red spectrometer. In the petroleum industry, however, some of the data available from a laboratory fractional distillation test can be obtained by no other method and the data may be of use either in the design of large scale columns or as a check on the performance of refinery plant. For this reason, analytical distillation processes will continue to occupy a major position in any laboratory dealing with petroleum and its products.

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A FLOATING FILLING STATION

Believed to be the first floating filling station of its kind, the barge "Good Service" has started operations on the Thames in the King's Reach, just below Westminster Bridge. Operated by R. G. Odell Ltd. as agents for Shell-Mex and B.P., the station was primarily provided for the convenience of the Thames Passenger Service Association, which comprises the operators of pleasure boats and is responsible for the maintenance of the water bus service. But many private craft as well have already taken advantage of the station's facilities.

A standard 120-ton Thames barge was converted by fitting two rectangular welded tanks of 50 tons capacity each. From these, diesel fuel is dispensed through two electrically operated kerb-side-type pumps. In addition, the barge carries two small deck tanks with a capacity of five tons, which provide vaporizing oil through hand-operated pumps. Smaller quantities of paraffin for navigation lights, lamps, cooking and cleaning, and a full range of marine lubricants and greases are also available. Supplies of diesel fuel reach the station by barge from Shell Haven.

Electricity is provided by two 1.5 kilowatt Lister diesel generators.

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PERSONAL NOTES

Among those on whom honours were conferred on the occasion of the celebration of His Majesty's birthday were: **Roger Duncalfe,** Chairman of the British Standards Institution (knighthood); **H. E. Watts,** M.B.E., G.M., Chief Inspector of Explosives, Home Office (C.B.), **J. F. Alcock,** Chief Scientist, Ricardo & Co. (O.B.E.) and **A. Nash,** director, Cabot Carbon Ltd. (O.B.E.).

D. A. Birchett, A.R.I.B.A., has been appointed architect to Shell-Mex and B.P. Ltd. He was lately with H. S. Goodhart-Rendel and Partners, F.F.R.I.B.A.

Thomas G. Delbridge, for many years manager of the Research and Development Department of the Atlantic Refining Co., was one of five members awarded Certificates of Honorary Membership of the ASTM at its Annual Meeting on June 19. He is a past-president of the Society and was for 20 years an officer of Committee D-2.

PETROLEUM IN PARLIAMENT

Oil Pollution

The Minister of Transport said on July 2 that the enquiry he had recently made from local authorities covered all aspects of the problem of oil pollution. It included the extent, cause, and effects of, and possible remedies for, pollution of the coasts of the U.K. When the replies had been collated they would be sent to the United Nations in accordance with recommendations made in April 1951.

Caltex Refinery

Asked for information regarding negotiations between his department, the Caltex Oil Co., and other interested parties in respect of the projected oil refinery at Bromwich, Mr Dalton said on July 3 that the company had not yet applied for planning permission in respect of any site in that area.

U.K. Motor Fuel Consumption

In a written answer on July 6 in the House of Commons, the Financial Secretary to the Treasury was asked the amount of each class of hydrocarbon oils retained for home consumption in the U.K. in the year ended March 31, 1951, the net amount of duty, and in particular the amounts received in respect of oils used as fuels in road vehicles. He gave details as shown below.

Fawley Refinery

In an oral reply on July 9 the Minister of Fuel and Power said: The refinery at Fawley has been constructed by the Esso Petroleum Company Ltd. I understand that they hope to bring it into partial operation this month, and most of it will be in use by the end of the year. Between now and Christmas the refinery will turn out about two million tons of petroleum products, including half a million tons of motor spirit.

When it is fully completed in 1953, it will employ about 2,500 workers, and its output will be about 6½ million tons a year, including 1¾ million tons of motor spirit. By the end of 1952, it will also produce about 12,000 tons of sulphur a year.

Dr H. M. King, the questioner, then asked the Minister whether he did not agree that the nation owed a great debt to the skill, loyalty and hard work of the men who had built the refinery at great speed and under great difficulties?

Class	Oils chargeable with Customs Duty Quantity		Receipts
	(Gallons)		£
Light Oils	1,632,089,710		120,024,465
Of which motor (including Aviation) spirit	1,580,582,289	£116,349,100	
Heavy Oils: For use as road fuel	259,328,855		19,034,681
Other Heavy Oils	2,726,359,414		638,210
Of which fully rebateable	2,573,186,385		
	Oils chargeable with Excise Duty		
	(Gallons)		
Light Oils	103,351,983		3,855,223
Of which motor (including Aviation) spirit	48,300,000*	£1,810,000*	
Heavy Oils: For use as road fuel	21,424,998		803,437
		TOTAL ...	£144,356,016
Allowances under Section 8 (4) of the Finance (No. 2) Act, 1945			825,348
		NET TOTAL ...	£143,530,668

*Owing to changes in the course of the year in the method of compiling excise statistics these figures are approximations only.

In the July issue it was recorded that members of the Stanlow Branch visited Gresford Colliery. This photo was apparently taken before they had removed "the coal-dust which had supplied local colour to hands and faces."

UNIVERSITY OF LONDON

Reporting on the work of the University of London during the year 1950-1, the principal, Dr D. W. Logan, records that the Shell Petroleum Co. Ltd. made a grant of £100 to University College for geological field work in 1951-2; that King's College received grants totalling £900 from the Institute of Petroleum towards the cost of apparatus for fundamental research, £100 from the Anglo-Saxon Petroleum Co. Ltd, for field work in geology, £500 from Monsanto Chemicals Ltd, for a research fellowship or studentship in chemistry, and £600 from the Anglo-Iranian Oil Co. Ltd, for hydrocarbon research.

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Bituminous Protectives. A 26-page booklet under the above title has recently been issued by the Association of Manufacturers of Bituminous Protective Products. Dealing first with the raw materials, their use in the manufacture of bituminous protectives is then discussed, and the final chapter gives some information as to the correct application of these materials. Enquiries should be addressed to the Association, c/o Messrs. Lithgow, Nelson & Co, 39 New Broad Street, London, E.C.2.

SHELL "MOTORISTS' GUIDE TO LONDON"

Shell-Mex and B.P. Ltd. have published a Shell "Motorists' Guide to London," price 5s, which is on sale from booksellers.

The guide is illustrated with photographs and with maps showing principal roads, approaches and routes across London, parking places, one-way streets, and theatres and cinemas. There are plans of difficult spots in London traffic, and hints on driving in London. Information is also included on the principal sights to be seen in and near London.

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The modernization of a 25-year-old refinery at El Dorado, Kansas, by Skelly Oil Co. and The M. W. Kellogg Co. is shown by flow diagrams and by pictures in Kellogg-gram No. 1 (1951) just issued by the latter company.

The modernization has two phases. First, the addition of crude distillation and fluid catalytic cracking, and second, the revamping of several process units including two thermal crackers, the vacuum flashing system, the vapour recovery system and the catalytic polymerization plant.

Copies can be obtained from The Kellogg Co. at 225 Broadway, New York 7.

SIR JOHN CASS COLLEGE

Details are available of courses on petroleum technology and on lubrication which are being arranged at the Sir John Cass College during the 1951-52 session, and these are summarized below.

General Technology of Petroleum

A series of twenty lectures, each of about one hour's duration will be given on Thursday afternoon's (2.45 p.m.). In addition two visits are being arranged, one to the refinery and laboratory at Fawley on November 29 and the second to the refinery and installation at Shell Haven or at Llandarcy on March 20. Details of the lectures are:

Oct. 4.	Introduction. Types of products. Origin of petroleum and types of hydrocarbons present.
Oct. 11.	Winning of petroleum and principles of fractionation.
Oct. 25.	Combustion of hydrocarbons. Uses, application, and properties of natural gas, liquefied gases, and natural gasoline.
Nov. 1.	Principle of the spark-ignition engine. Measurement of knocking.
Nov. 8.	Testing of gasoline and significance of results.
Nov.15.	Production of gasoline.
Nov.22.	Uses, testing, and manufacture of kerosines and special boiling point spirits.
Dec. 6.	Principles and fuel requirements of the compression ignition engine.
Jan. 10.	Fuels oils and their applications.
Jan. 17.	Applications, testing and manufacture of bituminous products.
Jan. 24.	Wear of metal surfaces. Function and applications of lubricating oils.
Jan. 31.	Testing and manufacture of lubricating oils.
Feb. 7.	Development of lubricants.
Feb. 14.	Application, testing, and manufacture of greases.
Feb. 21.	Paraffin wax refining and applications.
Feb. 28.	Special products and their appilcations. Chemicals from petroleum.
Mar. 6.	Bulk oil storage.
Mar. 13.	Oil measurement and transportation.
Mar. 27.	Research and development.

Lecturers are E. J. Boorman, B.Sc., Ph.D., D.I.C., F.Inst.Pet., P. F. Ellis, B.Sc., A.R.I.C., M.Inst.Pet., and L. W. G. Firmin, B.Sc.

Fee for the course is 30s and enrolment forms are obtainable from the Principal of the College at Jewry Street, Aldgate, E.C.3.

Lubrication

A course of six lectures at 6.30 p.m. on Thursday evenings begins on November 1 under the chairmanship of R. S. Teale, M.A. (Cantab.), A.R.I.C., F.Inst.Pet.

The lectures are as follows:

Nov. 1.	Theory of lubrication. C. B. Davies, M.A., Ph.D.(Cantab), F.R.I.C., M.Inst.Pet.
Nov. 8.	Manufacture of lubricants. A. W. W. Kirby, B.A., B.Sc. (Oxon).
Nov. 15.	Testing of lubricating oils and greases. C. S. Windebank, B.Sc., M.S., F.Inst.Pet.
Nov. 22.	Lubrication of internal combustion engines. O. T. Jones, B.Sc., M.I.Mech.E.
Nov. 29.	Lubrication of steam engines, turbines and compressors. D. Whyte, B.Sc. (Eng.), A.C.G.I.
Dec. 6.	Lubrication of gears and bearings and special lubricants application. R. S. Teale, M.A. (Cantab), A.R.I.C., F.Inst.Pet.

Fee for the course is 15s.

★ ★ ★

COMPANY PRODUCTION

	June 1951 *Brl.*
Trinidad Petroleum Dev. Co.	245,096
British Controlled Oilfields Ltd:	
Venezuela: Western area .	14,252
Central area .	15,861
Kern Oil Co Ltd:	
California	117,040
Trinidad	54,654
	May 1951 *Tons*
Anglo-Iranian Oil Co .	2,906,000

SULPHUR PLANT AT FAWLEY

A new major plant for the manufacture of sulphur is to be built at Fawley by Esso Petroleum Co. Ltd., When the plant is completed, early in 1953, it is expected to produce about 12,000 tons of 95.5 per cent chemically pure rock sulphur a year, almost all of which will be available to other industries.

This project forms the third stage of construction at the new Esso refinery, the first two stages comprising the building of the main refinery units for the production of fuels and lubricants.

The new refinery has been designed to extract from crude oil the maximum quantity of sulphur economically available in the refining operation and, at the same time, to use as little sulphur as possible in its various treating processes.

The new plant will convert, by means of a controlled oxidation process, the sulphur which is released in the refining of the crude oil This process is particularly interesting because it actually turns a disadvantage into an advantage, for Middle East crude is characterized by a higher sulphur content than crude oil from other parts of the world and a proportion of this sulphur has in any case to be removed from the refined products.

There has been the fullest of co-operation between the Company and the Government in organizing and planning these facilities. British labour and substantially British materials will be used.

★ ★ ★

SPANISH OIL SHALE

First step in the erection of plant for the exploitation of oil shale at Puertollano, province of Ciudad Real, Spain, is the recent opening of a new 50,000-kW power plant. *The Financial News* correspondent reports that the deposits are calculated to exceed 120 million tons, minimum oil content per ton being put at 11.5 per cent and extractable sulphate of ammonia 10 per cent.

Production is expected to start early in 1952 with a throughput of 1.2 million tons of shale a year. Yield of crude oil is estimated at 140,000 tons per year. The work is being undertaken by the Calvo Sotelo group, a state-owned concern.

★ ★ ★

APPOINTMENTS VACANT

ESSO PETROLEUM COMPANY LTD. have vacancies for **CHEMISTS** and **CHEMICAL ENGINEERS** in the following SUPERVISORY POSTS at their New Refinery at Fawley, near Southampton.

Candidates should have a good honours degree and preference will be given to those with Petroleum experience. These posts are pensionable.

(*a*) ASSISTANT CHIEF CHEMIST.

Candidates should have a good honours degree, experience of supervising a Laboratory with graduate and non-graduate staff engaged upon quality control and plant research work related to the manufacture of a wide range of petroleum products.

(*b*) PROCESS ENGINEER TO TAKE CHARGE OF CRACKING SECTION, TECHNICAL SERVICE DEPT.

Candidates should preferably have experience of design and plant problem work on thermal and catalytic cracking units.

(*c*) PROCESS ENGINEER TO TAKE CHARGE OF LUBRICATING OIL SSECTION, TECHNICAL SALES DEPT.

Candidates should preferably have design and plant problem experience on lubricating oil processing plant.

APPLICATIONS, stating age, qualifications, experience and salary required, should be sent to the Employee Relations Superintendent, Esso Petroleum Co. Ltd., Fawley, Southampton.

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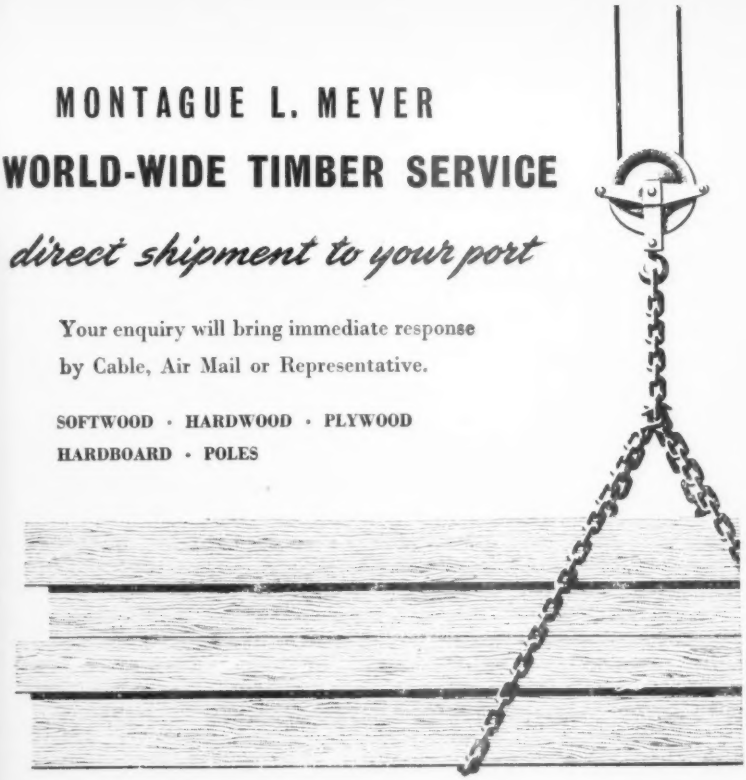

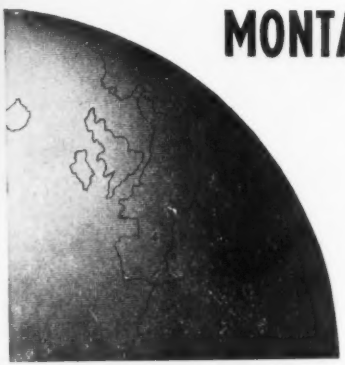

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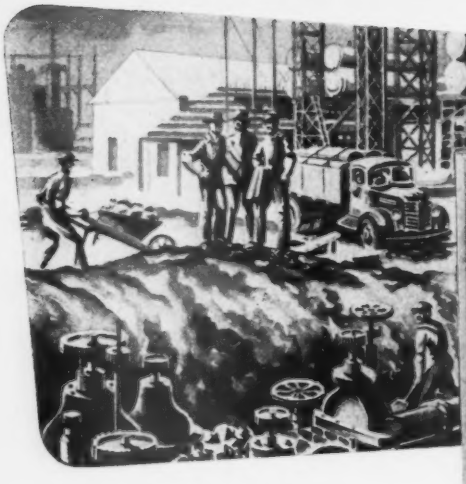

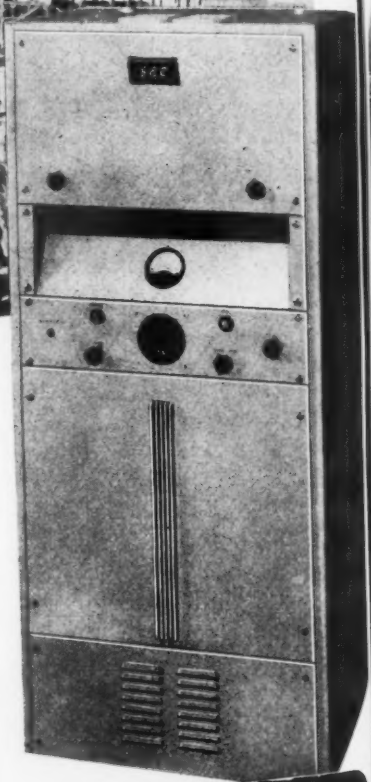

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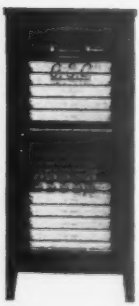

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Now the second distillation unit has been put in hand, and once more Sigmund are to be responsible for the pumps. This new contract raises the total of Sigmund pumping equipment at the Cardon refinery to over 20,000 h.p., in a plant which will have an intake of crude oil in the region of 140,000 barrels a day when the additional distillation unit is completed—sufficient to provide over a third of Britain's requirements of petroleum products.

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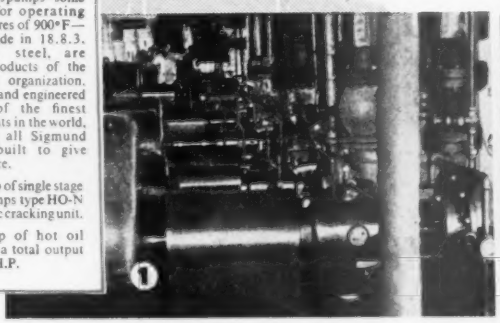

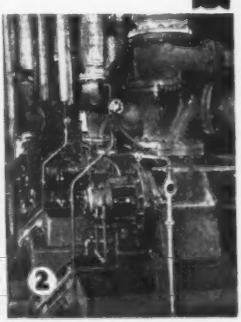

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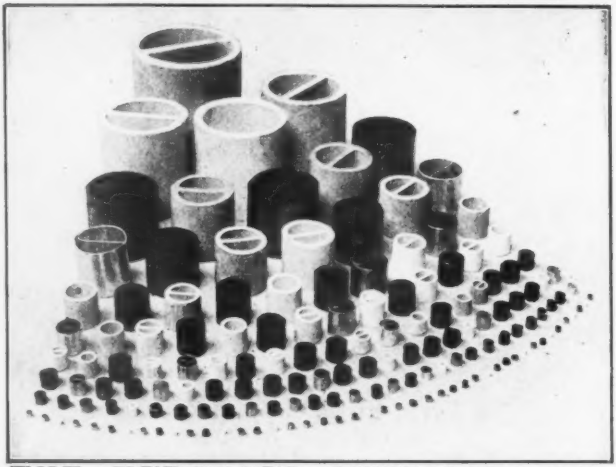

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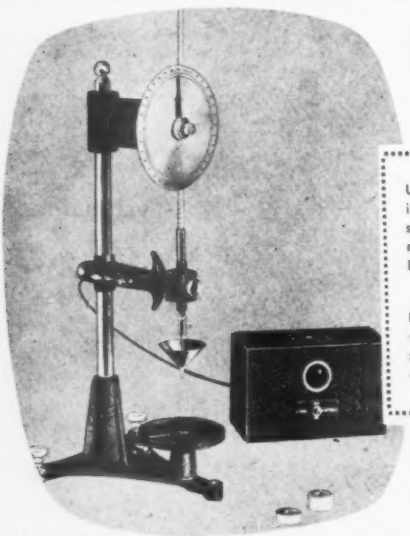

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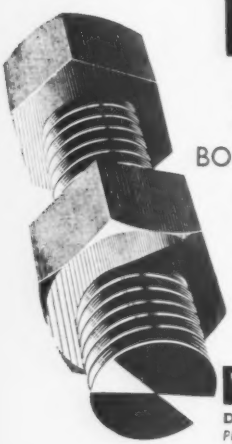

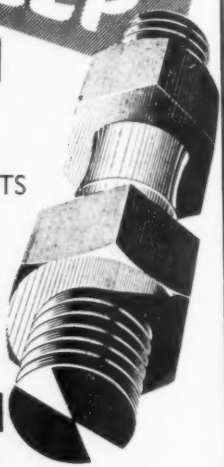

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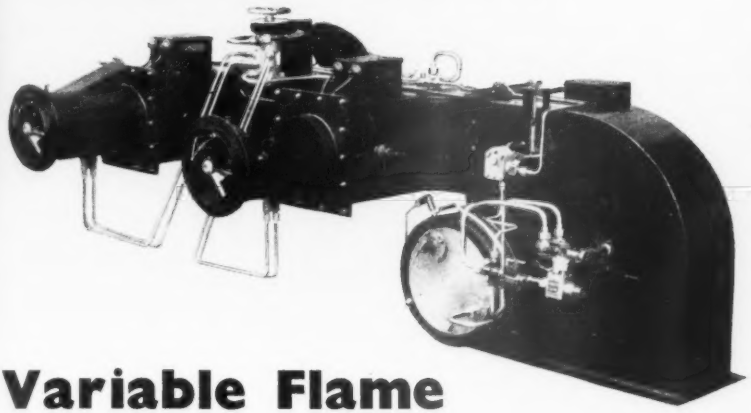

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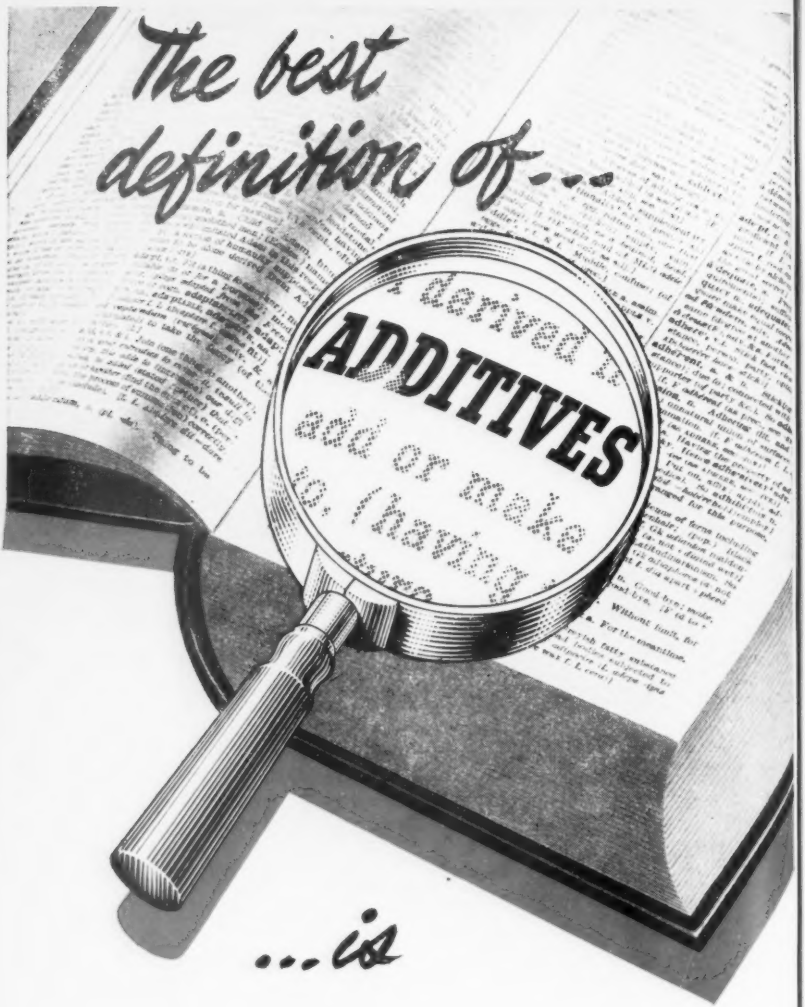

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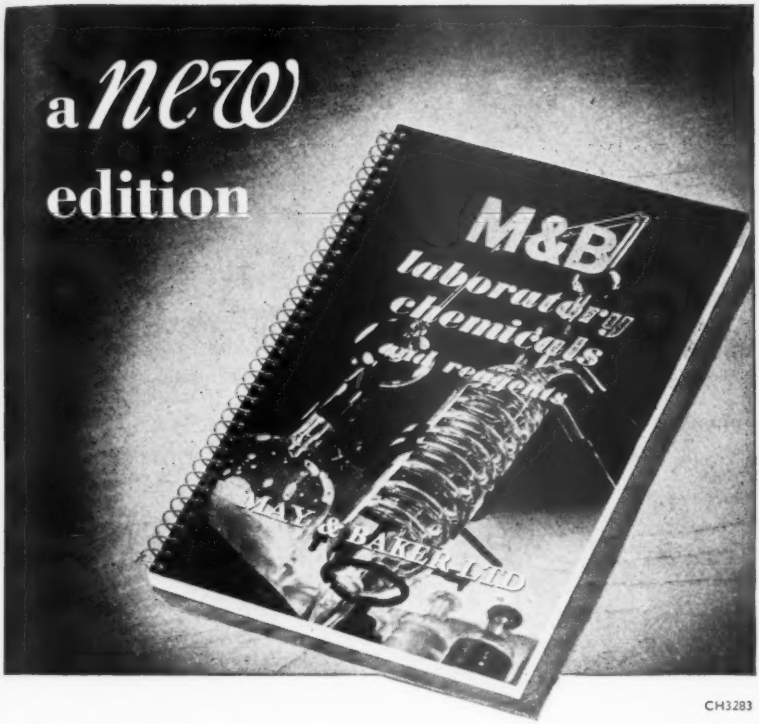

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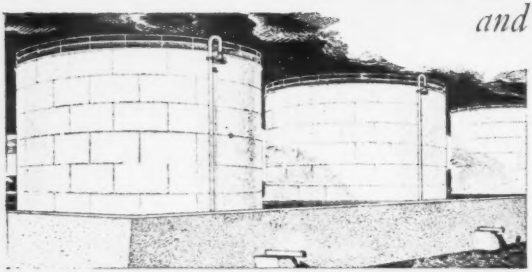

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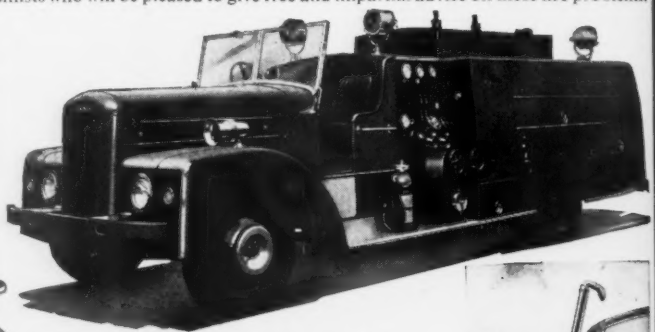

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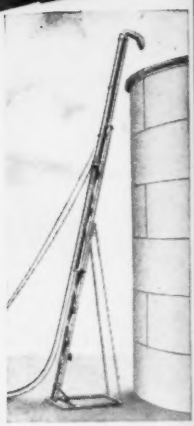

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